



INTERPRETING YOUR SOIL EVALUATION for Septic System Design

Using soil evaluations to assess site conditions for septic systems is becoming more common in Illinois. Lake County has been requiring soil evaluations since 1989. While soil evaluation reports vary in content and format depending on the author, many common elements are shared by all of these reports. This document provides a basic explanation of the soil characteristics described in soil profile descriptions.

Each soil described can be classified to the series level. A soil series is equivalent to a plant or animal species, in that a series represents a specific type of soil that can occur over a large geographic area. Soil series are often named for places near where they were first described (examples include Wauconda, Barrington, Mundelein). There are roughly 17,000 soil series in the United States, with over 600 found in Illinois. Lake County has 50. Each series has formed in one or more parent materials. Common parent materials include loess (wind-blown silty sediment), outwash (water-deposited sand and gravel or water-sorted loamy material), alluvium (soils of variable texture formed in and near floodplains), and till (mixture of sand, silt, clay, and coarser fragment deposited by glaciers). The most common and widespread parent material in Lake county is clayey glacial till. Historically, the testing method used to obtain information about soil for a septic system was the percolation test or “perc test”. There are several advantages to using soil evaluations rather than perc tests with the most important being that soil evaluations: identify layers in the soil that restrict the downward movement of water (limiting layers); identify soil textures and structures that impact system installation and; provide accurate information regardless of the seasons or weather conditions.

SOIL DESCRIPTIONS

A large amount of information is included in the descriptions of soil profiles. Each part of a typical soil description is discussed in detail below.

Horizon

Layers within the soil that differ in color, clay content, or other ways are divided into horizons. Four to seven horizons are commonly present within the top 60 inches of a soil profile. The surface, or topsoil, is generally called the A horizon. A light-colored E horizon lies near the surface of some soils as well, particularly on land that is or has been wooded. The subsoil, where clay accumulates, blocky and prismatic structure develops, and colors are variable, is called the B horizon. The substratum, which consists of

relatively unweathered soil material, is called the C horizon. Each of these master horizons can be subdivided if characteristics within them vary (for example, A1 and A2). Transitional horizons, such as AB or BC are also recognized. Features within each horizon can be recognized with lower case letters. Examples include Bt (clay accumulation in the B horizon), Bg (gray colors in the B horizon indicating poor internal drainage), and Ab (an A horizon that has been covered by fill or alluvial sediment). If parent materials change within the soil, it is signified with a number at the beginning of the horizon designation (examples include 2Bt and 3C).

Depth

The location of each described horizon in inches below the surface is given in this section.

Dominant Color

Soil colors are described through use of the Munsell soil color charts. These charts consist of color chips that have been assigned names based on their hue, value, and chroma. Common colors and examples of Munsell designations that would describe these colors are given below:

Black 10YR 2/1 and N 2/0

Brown 10YR 4/3 and 7.5YR 4/4

Gray 2.5Y 6/2 and 5Y 5/1

Yellow/Red 7.5YR 6/6 and 10YR 5/8

Iron is a major coloring agent in the soils of Illinois. Brown, yellowish, or reddish colors are mainly the result of precipitated iron (essentially rust) that coats soil particles. These colors generally indicate good internal soil drainage. When a soil is frequently saturated (poorly drained), the iron is dissolved and leached away, leaving a gray color that is the base color of the soil particles. Poorly drained soils often have a uniform gray or mottled, gray/red color pattern. The black color of topsoil is created by high organic matter content, which masks the coloring effects of iron.

Texture

Texture is a group of terms that describe the amount of sand, silt and clay present in soils. These terms include sand (s), loamy sand (ls), sandy loam (sl), sandy clay loam (scl), loam (l), clay loam (cl), silt loam (sil), silty clay loam (sicl), silty clay (sic), and clay (c). In general, as silt and clay content increases in a soil, the permeability decreases. Silt loam and silty clay loam textures are very common in Illinois, having formed in loess parent material. When clay content in soils exceeds 35% (heavy cl, heavy sicl, sic, or c textures), the soils are generally poorly suited for subsurface soil absorption systems because of slow permeability.

Redoximorphic Features (Mottles)

In soils where the water table fluctuates or where restrictive layers slow or stop water movement, soil horizons often contain many different colors. This variable color pattern indicates the level of the seasonal high water table (SHWT), which is important since the SHWT is considered a limiting layer. These contrasting soil colors traditionally are

referred to as mottles, or more recently as redoximorphic (redox) features. The term “redox” comes from a combination of the terms “reduction” and “oxidation”, which are natural chemical/biological processes that affect iron and other minerals in the soil. The redox features section documents the various colors present in addition to the dominant color, and their abundance and pattern. Munsell colors for redox features are preceded by a description such as c2d. The first letter indicates color abundance, with f meaning less than 2% of the total soil matrix, c meaning 2%-20%, and m meaning greater than 20%. The second number is the general size of the redox feature, and includes fine (1), medium (2), and coarse (3). The final letter of the code is how much the color contrasts with the dominant color, and includes faint (f), distinct (d), and prominent (p).

If a soil horizon contains more than 2% redox features (such as a 10YR 4/3 dominant color with c1d 2.5Y 5/2 redox features), it indicates that this horizon is affected by a SHWT. This type of color pattern would suggest that the SHWT is present during wet times of the year, and will interfere with efficient soil absorption (septic field) of wastewater if not accounted for by the system design.

Structure

The structure of a soil is a description of the shapes soil form in different parts of the profile. It can be thought of as the pieces of a three dimensional puzzle. The pieces fit tightly together but there are still cracks and crevices in between them where water flows. Structure is formed largely by cycles of wetting/drying and freezing/thawing, the soil's chemical composition, root penetration, and the aggregating affect of some soil microbes. It takes many years to form. It is extremely important in clayey soils for water and air movement and must not be destroyed by compaction during the construction of a system. Types of structure include granular (gr), which is common in the A horizon; subangular blocky (sbk), angular blocky (abk), and prismatic (pr), which are common in the B horizons; platy (pl) which is found in E horizons of timber soils or where compaction has occurred; and massive (ma) or single grain (sg), which is usually found in C horizons. Well-structured soils have large amounts of interconnected pores, which accelerate water and air movement. Weakly structured soils have less continuous pore space, which slows water and air movement. Structure is ranked on a scale of 0 to 3 (structureless, weak, moderate, strong). Structure size is also determined, and classified as fine (f), medium (m), and coarse (c). Blocky, prismatic, granular, and single grain structures are generally favorable for septic systems in soils with low to moderate clay contents. A typical description is 2msbk meaning – moderate, medium, sub-angular blocky.

Consistence

Consistence is a measure of how easily soil can be crushed between the thumb and forefinger. Classes of consistence include very friable (vfr), friable (fr), firm (fi), very firm (vfi), and extremely firm (xfi). In general, as soil consistence increases in firmness, permeability decreases due to a diminishing volume of pore space within the soil.

Coatings

Coatings of clay or organic matter are often deposited in the B horizons by water percolating downward. The color of these coatings is determined, preceded by a

[illegible]

Profile of Varna Silt Loam

